OGGETTO SOTTOPOSTO A PROVE / *ITEM UNDER TEST*	
Descrizione *Description*	Visualization system based on 32" TFT module and industrial embedded PC
Modello *Model type*	***COMPACT 32 500 M J1900 ACL MD SCL*** ***Cod.993201600101***
Identificativo interno *Storage No.*	180002 (sampled by applicant)
Richiedente *Applicant*	Aesys S.p.A.
Indirizzo *Address*	Via Pastrengo, 7/C I-24068 Seriate (BG) - Italia
Prove effettuate presso *Test carried out by*	TÜV Rheinland Italia Srl Via E. Mattei, 3 – 20010 Pogliano Milanese (Italy)
Norme di riferimento *Reference Standards*	**EN 50121-4:2015 par.6.2** **EN 61000-3-2:2014; EN 61000-3-3:2013**
Scopo delle prove *Scope of the tests*	To verify the compliance with the following clauses of reference standards - See summary of testing at *TEST SUMMARY* section
Risultati di prova *Test Results*	**COMPLIANT**

Data ricevimento campioni *Date of samples receiving*	04/01/2018		
Data inizio prove *Date of tests start*	26/02/2018	**Data fine prove** *Date of tests end*	27/02/2018
Rapporto composto da *Test report composed by*	25 Pages		

Provato da / Tested by *(name + signature)*		**Approvato da / Approved by** *(name + signature)*
Firmato da: Andrea Bortolotti Motivo: Data: 12/03/2018 17:45:19 Andrea Bortolotti *(Laboratory Technician)*		Firmato da:Giovanni Molteni Data: 14/03/2018 14:18:47 Giovanni Molteni (*Technical & Laboratory Manager*)

The results referred in this report are only relevant to the samples tested and described in this report.
Only complete reproduction of this test report is permitted without written authorisation of TÜV Rheinland Italia
Compliance with test requirements recorded in this technical report does not give presumption of compliance to all requirements by reference standard.

RELEASE CONTROL RECORD		
TEST REPORT NUMBER	REASON OF CHANGE	DATE OF ISSUE
28111272-001	Original release	12/03/2018

OGGETTO SOTTOPOSTO A PROVE / *ITEM UNDER TEST*	
Descrizione *Description*	Visualization system based on 32" TFT module and industrial embedded PC
Marca *Brand*	aesys
Costruttore *Manufacturer*	Aesys S.p.A.
Modello *Model / Type reference*	Compact 32 500 M J1900 ACL MD SCL code: 993201600101
Dati di targa *Ratings*	100-230Vac ~ 50/60Hz
Classificazione *EUT classification*	---
Massima frequenza di clock *Maximum clock frequency*	Not declared
Installazione *Standing*	Wall / Ceiling / Embedded / Pole support

PORTE DI INTERFACCIA / *INTERFACE PORTS*				
Port	**Description**	**Connections**		
		Description	**(Un)Shielded**	**Length (m)**
Enclosure	*Metallic and Glass*	*Screw*	---	---
AC Mains	*100-230V~ 50/60Hz*	*Connector & cable*	*Unshielded*	*>3mt*
DC Mains	Port not present	---	---	---
Signal	Ethernet	RJ45 cable	Shielded	>3mt
Note: During the test all cables must be what provided the manufacturer of the same that used in the real employment of the EUT				

MODELLI DERIVATI / *DERIVED MODELS*		
Model name	**Manufacturer**	**Speaking code**
Compact 32" 500 z J1900 y x	*Aesys*	*z: M – Monolitic glass 6mm or 4 mm* *L – Laminated glass 3+3mm*
	Aesys	*y: MD – Media Converter* *ACL – Accellerometer* *SCL - Sclading*
	Aesys	*x: SSD – External drive 2,5″*

COMPONENTI AUSILIARI / *ANCILLARY EQUIPMENTS**		
Description	**Manufacturer**	**Model name**
Laptop PC	*Lenovo*	*T61*

**not provided by the customer*

MODALITA' DI FUNZIONAMENTO / OPERATING MODES			
Operation mode		**Description**	**Representative parameter**
#1	TFT ON –audio active Ethernet link	Moving image, audio reproduction, ping active to auxiliary component	image shown on TFT monitor, Ethernet link

CRITERI DI VALUTAZIONE PER I TEST DI IMMUNITA' / *COMPLIANCE CRITERIA FOR IMMUNITY TESTS*

Extracted from the standard 50121-1:

The variety and the diversity of the apparatus within the scope of this set of standards makes it difficult to define precise criteria for the evaluation of the immunity test results.
If, as a result of the application of the tests defined in this set of standards, the apparatus becomes dangerous or unsafe, the apparatus shall be deemed to have failed the test.
A functional description and a definition of performance criteria, during or as a consequence of the EMC testing, shall be provided by the manufacturer and noted in the test report, based on the following criteria:

***Performance criterion A**: The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.*
***Performance criterion B:** The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.*
***Performance criterion C:** Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls*

Representative parameter	Acceptable level of performance	Observation mode		
		Acquisition	Test equipment	Test n.
Displayed moving image	The image has to be displayed as at the beginning of the test	By visualization	Operator	All immunity tests
TCP/IP traffic	No data loss	By visualization	PC	All immunity tests

Reference Document		Title of Document
EN 50121-4	2015*	Railway applications - Electromagnetic compatibility Part 4: Emission and immunity of the signalling and telecommunications apparatus
EN 50121-1	2015*	Railway applications - Electromagnetic compatibility Part 1: General
EN 61000-3-2	2014*	Electromagnetic compatibility (EMC) Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)" is an international standard concerning the harmonics emitted by electric equipment.
EN 61000-3-3	2013*	Electromagnetic compatibility (EMC) Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current <= 16 A per phase and not subject to conditional connection
EN 61000-4-2	2009*	Electromagnetic compatibility (EMC) Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test
EN 61000-4-3 A1 A2	2006* 2007 2010	Electromagnetic compatibility (EMC) Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test
EN 61000-4-4	2012*	Electromagnetic compatibility (EMC) Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test
EN 61000-4-5	2014*	Electromagnetic compatibility (EMC) Part 4-5: Testing and measurement techniques – Surge immunity test
EN 61000-4-6	2014*	Electromagnetic compatibility (EMC) Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields
EN 61000-4-8	2010*	Electromagnetic compatibility (EMC) Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test
EN 61000-4-9	2016*	Electromagnetic compatibility (EMC) Part 4-9: Testing and measurement techniques Pulse magnetic field immunity test
EN 61000-4-11	2004*	Electromagnetic compatibility (EMC) Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests

* For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

SOMMARIO DELLE PROVE / *TESTS SUMMARY*

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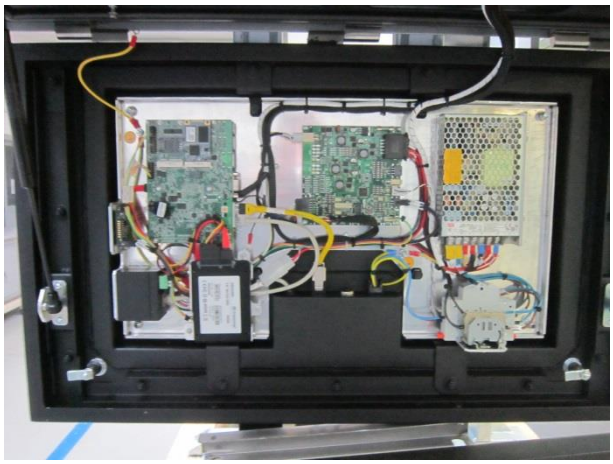
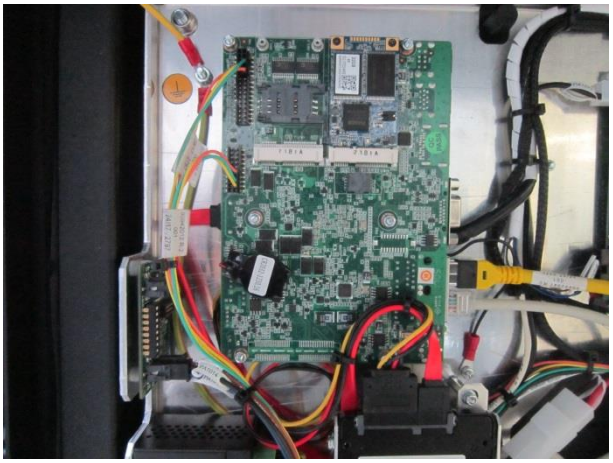
ESITO DELLE PROVE DI EMISSIONE / *EMISSION TESTS RESULT*		
Prova / Test	**Porta / Port**	**Esito / Result**
Armoniche di corrente */ Harmonic current emissions*	AC mains	COMPLIANT
Flicker e oscillazioni di tensione / *Voltage fluctuations and flicker*	AC mains	COMPLIANT

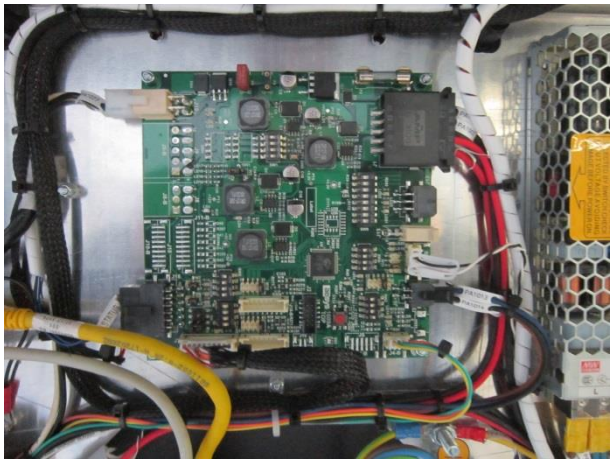
ESITO DELLE PROVE DI IMMUNITA' / *IMMUNITY TESTS RESULT*		
Prova / Test	**Porta / Port**	**Esito / Result**
Immunità radiata / Radiated electromagnetic field	Enclosure	COMPLIANT
Buchi e interruzioni brevi di tensione / *Dips and Short interruptions*	AC mains	COMPLIANT
Campo magnetico a frequenza di rete / *Power frequency magnetic field*	Enclosure	COMPLIANT
Campo magnetico impulsivo / *Pulsed magnetic field*	Enclosure	COMPLIANT

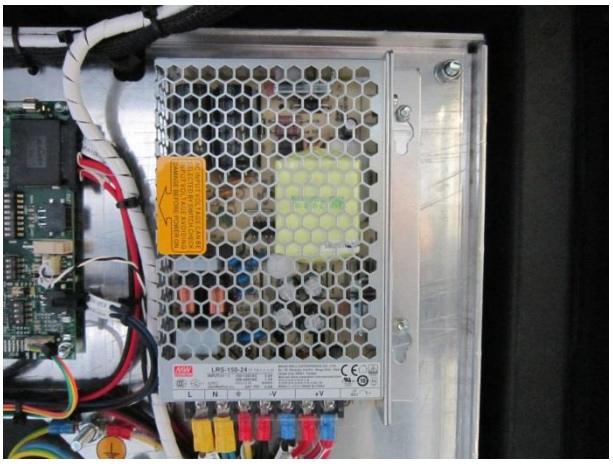
Compliant = Result within the limits
N/A = Not Applicable
N/R = Not requested by the Client

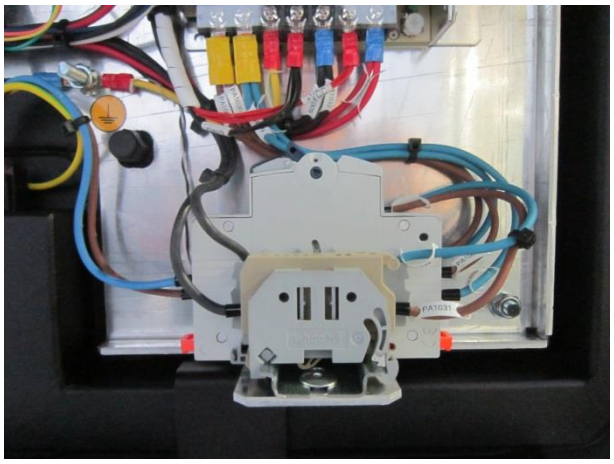
DOCUMENTAZIONE FOTOGRAFICA / *PHOTOGRAFIC DOCUMENTATION*

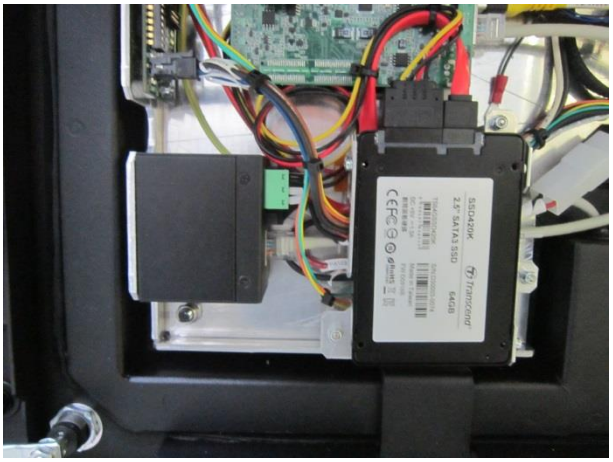


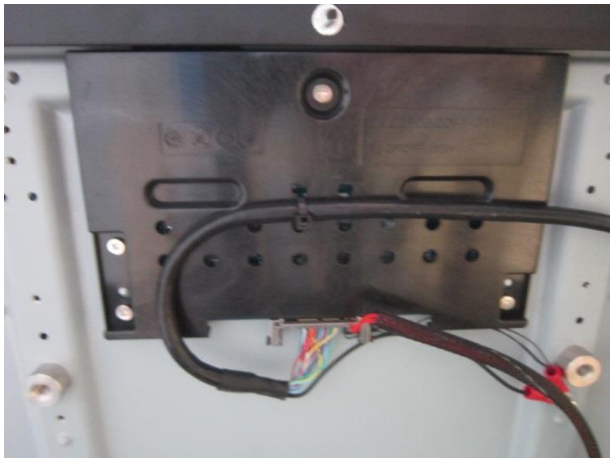


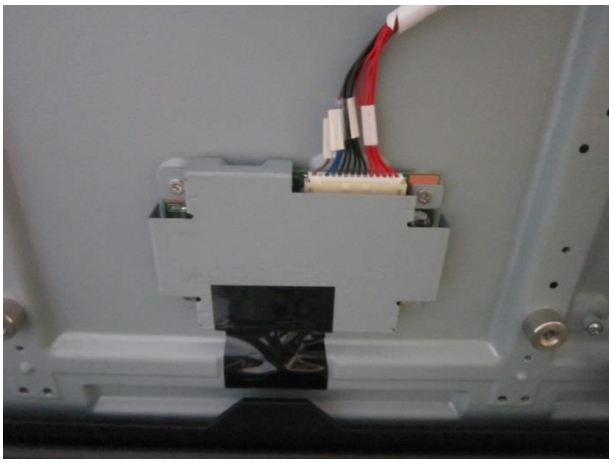


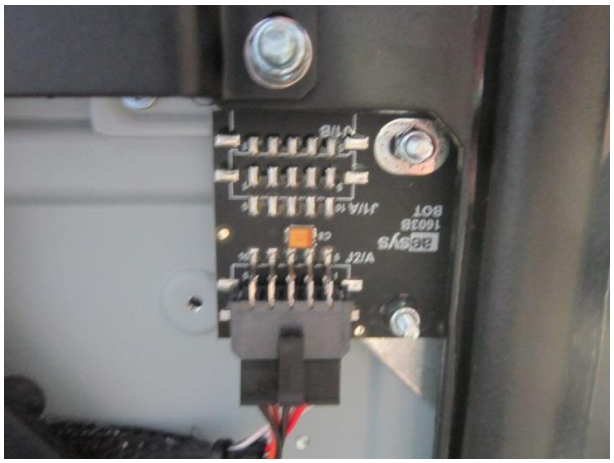


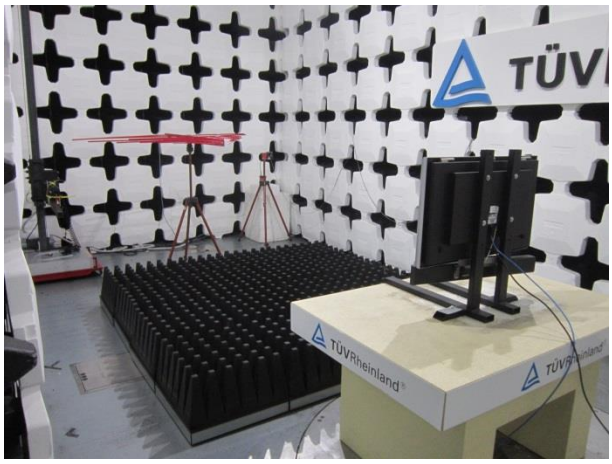








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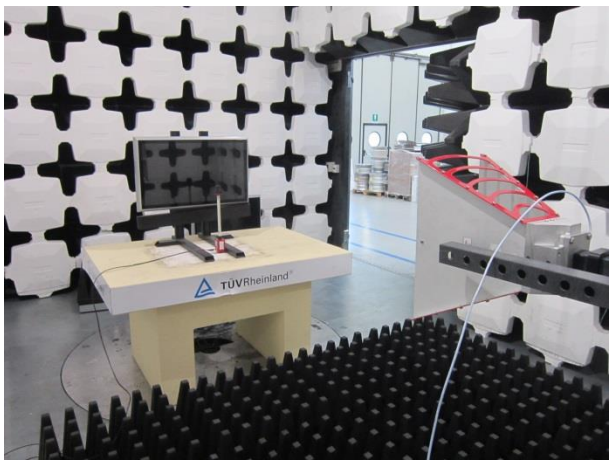
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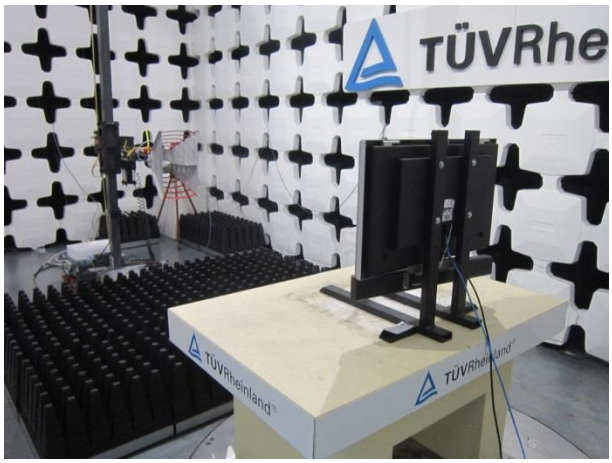
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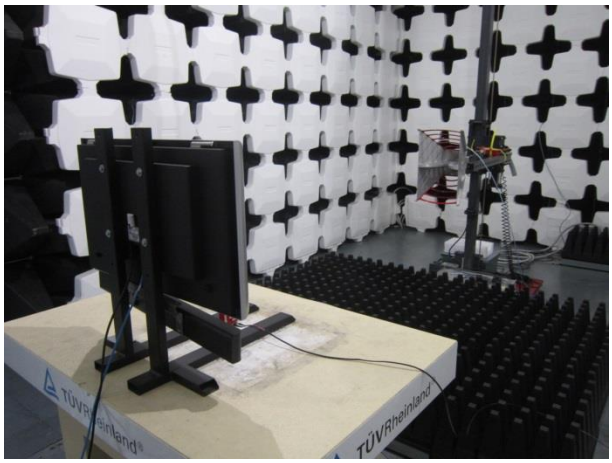
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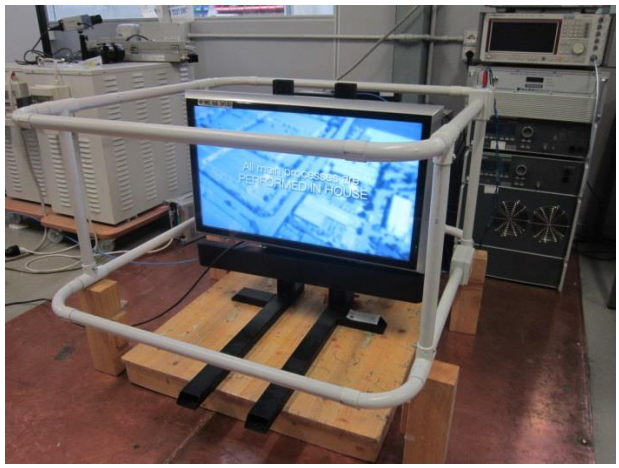

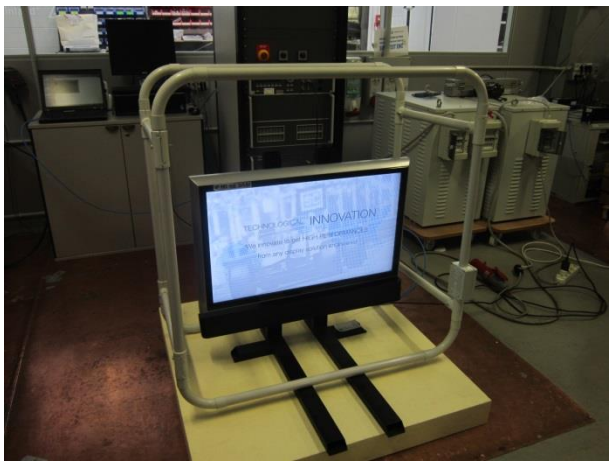

Test N.1	**RADIATED IMMUNITY -** *IMMUNITA' RADIATA*

Reference Standard	EN 61000-4-3
Operative instruction	IO_BSP_933_004
List of reference equipment	➢ Semianechoic Chamber ETS-Lindgren mod.FACT3 (Inv. 8020484) ➢ RF Generator Rohde&Schwarz mod.SMB100A (Inv. 87020456) ➢ RF Amplifier Vectawave mod.VBA 1000-275 (Inv. 87020472) ➢ RF Amplifier Bonn mod.BLMA 1060-75/50D (Inv.87020473) ➢ Directional Coupler CMC mod.441499 (Inv.87020478) ➢ Directional Coupler Werlatone mod.C8000-102 (Inv.87020479) ➢ Antenna Log-periodica ETS-Lindgren mod.3150B (Inv. 87020464) ➢ Antenna Horn ETS-Lindgren mod.3119 (Inv. 87020462)
Measurement Uncertainty	Expanded uncertainty: 2,2 dB Coverage probability: 95 % Coverage factor: 2,14

Number of samples under test	1

Test Conditions	Required	Measured
Ambient Temperature	(15 ÷ 35) °C	(21.4 ± 2) °C
Ambient Relative Humidity	(25 ÷ 75) %rH	(49.8 ± 10) %rH

Test Setup	EN 61000-4-3
Test Procedure	EN 61000-4-3
EUT Operating Mode(s)	#1
Test Voltage	230V ~ 50Hz

Test Results

Tested Port	Disturbance Characteristics			Notes	Result classification	Result
	Level (V/m)	Frequency (GHz)	Modulation			
Enclosure	20	0.08 – 1.0	1kHz, AM 80%	No performance degradation	A	Complies within acceptance criteria
Enclosure	10	1.4 – 2.0	1kHz, AM 80%	No performance degradation	A	Complies within acceptance criteria
Enclosure	5	2.0 – 2.7	1kHz, AM 80%	No performance degradation	A	Complies within acceptance criteria
Enclosure	3	5.1 - 6.0	1kHz, AM 80%	No performance degradation	A	Complies within acceptance criteria

Test N.2	**HARMONIC CURRENTS** – *ARMONICHE DI CORRENTE*

Reference Standard	EN 61000-3-2
Operative instruction	IO_BSP_236_019
List of reference equipment	➢ Stabilized Power Supply Ametek mod. MX30 (Inv. 87010273) ➢ Harmonics Analyzer EMTest mod. DPA503 (Inv. 87010274)
Measurement Uncertainty	Expanded uncertainty: 4,1% of reading Coverage probability: 95 % Coverage factor: 2,0

Number of samples under test	1

Test Conditions	**Required**	**Measured**
Ambient Temperature	(15 ÷ 35) °C	(21 ± 2) °C
Ambient Relative Humidity	(25 ÷ 75) %rH	(50 ± 10) %rH

Test Setup	EN 61000-3-2 Annex A
Test Procedure	EN 61000-3-2 par. 6.2
EUT Operating Mode(s)	#1
Acceptance Criteria	Limits are indicated in EN 61000-3-2, Class A
Test Voltage	230V ~ 50Hz

Average harmonic current results

Hn	Ieff [A]	% of Limit	Limit [A]	Result
1	247.341E-3			
2	3.683E-3			PASS
3	234.175E-3	11.313	2.07	PASS
4	4.914E-3			PASS
5	212.076E-3	20.670	1.03	PASS
6	3.981E-3			PASS
7	189.639E-3	27.365	693.00E-3	PASS
8	3.556E-3			PASS
9	158.617E-3	44.060	360.00E-3	PASS
10	2.844E-3			PASS
11	122.534E-3	41.257	297.00E-3	PASS
12	2.441E-3			PASS
13	88.186E-3	46.659	189.00E-3	PASS
14	2.280E-3			PASS
15	56.485E-3	41.841	135.00E-3	PASS
16	2.158E-3			PASS
17	30.412E-3	25.531	119.11E-3	PASS
18	2.140E-3			PASS
19	13.642E-3	12.800	106.58E-3	PASS
20	2.067E-3			PASS
21	12.445E-3	12.906	96.43E-3	PASS
22	2.010E-3			PASS
23	17.735E-3	20.143	88.05E-3	PASS
24	1.901E-3			PASS
25	19.722E-3	24.348	81.00E-3	PASS
26	1.837E-3			PASS
27	18.027E-3	24.037	75.00E-3	PASS
28	1.780E-3			PASS
29	13.727E-3	19.658	69.83E-3	PASS
30	1.785E-3			PASS
31	8.564E-3	13.111	65.32E-3	PASS
32	1.773E-3			PASS
33	4.444E-3			PASS
34	1.807E-3			PASS
35	4.145E-3			PASS
36	1.782E-3			PASS
37	6.081E-3	11.111	54.73E-3	PASS
38	1.754E-3			PASS
39	7.147E-3	13.766	51.92E-3	PASS
40	1.785E-3			PASS

Maximum harmonic current results

Hn	Ieff [A]	% of Limit	Limit [A]	Result
1	254.460E-3			
2	5.142E-3	0.238	2.16	PASS
3	241.152E-3	5.242	4.60	PASS
4	6.388E-3	0.743	860.00E-3	PASS
5	217.627E-3	9.545	2.28	PASS
6	5.542E-3	0.924	600.00E-3	PASS
7	195.801E-3	12.714	1.54	PASS
8	4.856E-3			PASS
9	164.949E-3	20.619	800.00E-3	PASS
10	3.787E-3			PASS
11	128.751E-3	19.508	660.00E-3	PASS
12	3.087E-3			PASS
13	95.207E-3	22.668	420.00E-3	PASS
14	2.846E-3			PASS
15	63.712E-3	21.237	300.00E-3	PASS
16	2.685E-3			PASS
17	36.344E-3	13.730	264.70E-3	PASS
18	2.848E-3			PASS
19	17.114E-3	7.226	236.84E-3	PASS
20	2.660E-3			PASS
21	19.791E-3	9.236	214.28E-3	PASS
22	2.505E-3			PASS
23	20.624E-3	10.540	195.66E-3	PASS
24	2.279E-3			PASS
25	20.695E-3	11.497	180.00E-3	PASS
26	2.100E-3			PASS
27	19.618E-3	11.772	166.66E-3	PASS
28	2.045E-3			PASS
29	15.897E-3	10.244	155.18E-3	PASS
30	2.166E-3			PASS
31	11.073E-3	7.628	145.16E-3	PASS
32	2.095E-3			PASS
33	7.280E-3	5.339	136.36E-3	PASS
34	2.157E-3			PASS
35	8.260E-3	6.424	128.58E-3	PASS
36	2.083E-3			PASS
37	8.185E-3	6.730	121.62E-3	PASS
38	2.034E-3			PASS
39	7.874E-3	6.824	115.38E-3	PASS
40	2.012E-3			PASS

Test N.3	***FLICKER –*** *FLICKER*

Reference standard	EN 61000-3-3
Operative instruction	IO_BSP_236_019
List of reference equipment	➢ Stabilized Power Supply Ametek mod. MX30 (Inv. 87010273) ➢ Harmonics Analyzer EMTest mod. DPA503 (Inv. 87010274) ➢ Flicker reference Impedance EM Test mod. AIF503N32 (Inv. 87010275)
Measurement Uncertainty	Expanded uncertainty: 5,4% Coverage probability: 95 % Coverage factor: 2,0

Number of samples under test	1

Test Conditions	**Required**	**Measured**
Ambient Temperature	(15 ÷ 35) °C	(21 ± 2) °C
Ambient Relative Humidity	(25 ÷ 75) %rH	(50 ± 10) %rH

Test Setup	EN 61000-3-3 par. 4
Test Procedure	EN 61000-3-3 par. 6
EUT Operating Mode(s)	#1
Acceptance Criteria	Limits are indicated in EN 61000-3-3 par. 5
Test Voltage	230V ~ 50Hz

	EUT values	Limit	Result
Pst	0.028	**1.00**	PASS
Plt	0.028	**0.65**	PASS
dc [%]	0.012	**3.30**	PASS
dmax [%]	0.195	**4.00**	PASS
dt [s]	0.000	**0.50**	PASS

Test N.4	***VOLTAGE DIPS –*** *BUCHI DI TENSIONE*

Reference Standard	IEC/EN 61000-4-11
Operative instruction	IO_BSP_933_011
List of reference equipment	➢ Stabilized Power Supply Ametek mod. MX30 (Inv. 87010273) ➢ Software MXGUI
Measurement Uncertainty	Expanded uncertainty: 4,6% Coverage probability: 95 % Coverage factor: 2,05

Number of samples under test	1

Test Conditions	**Required**	**Measured**
Ambient Temperature	(15 ÷ 35) °C	(21 ± 2) °C
Ambient Relative Humidity	(25 ÷ 75) %rH	(50 ± 10) %rH

Test Setup	IEC/EN 61000-4-11 par. 7	
Test Procedure	IEC/EN 61000-4-11 par. 8	
EUT Operating Mode(s)	#1	
Acceptance Criteria	B (see *COMPLIANCE CRITERIA FOR IMMUNITY TESTS)*	
Test Voltage	230V ~ 50Hz	110~ 60Hz

Test Results voltage dips – 230V~ 50Hz

Tested Port	Dip to %	Ts (Cycles)	Result Classification	Notes
AC mains	0%	0,5	A	No performance degradation
AC mains	0%	1	A	No performance degradation
AC mains	70%	25	A	No performance degradation

Test Results short interruptions - 230V~ 50Hz

Tested Port	Dip to %	Ts (Cycles)	Result Classification	Notes
AC mains	0%	250	C	Monitor power down. Auto restart after interruption

Test Results voltage variations - 230V~ 50Hz

Tested Port	Dip to %	Td	Ts (Cycles)	Ti (Cycles)	Result Classification	Notes
AC mains	70%	Abrupt	1	25	A	No performance degradation

Test Results voltage dips – 110V~ 60Hz

Tested Port	Dip to %	Ts (Cycles)	Result Classification	Notes
AC mains	0%	0,5	A	No performance degradation
AC mains	0%	1	A	No performance degradation
AC mains	70%	30	A	No performance degradation

Test Results short interruptions - 110V~ 60Hz

Tested Port	Dip to %	Ts (Cycles)	Result Classification	Notes
AC mains	0%	300	C	Monitor power down. Auto restart after interruption

Test Results voltage variations - 110V~ 60Hz

Tested Port	Dip to %	Td	Ts (Cycles)	Ti (Cycles)	Result Classification	Notes
AC mains	70%	Abrupt	1	30	A	No performance degradation

Test N.5	**MAGNETIC FIELD -** *CAMPO MAGNETICO*

Reference Standard	EN 61000-4-8
Operative instruction	IO_BSP_933_008
List of reference equipment	➢ Functions Generator Sigilent mod. SDG1010 (Inv. 87020516) ➢ DC Power Supply Sorensen mod. DCS33-33E (Inv. 87020517) ➢ Load & Switchbox SPIN-MAGIMM (Inv. 87020518) ➢ Loop MAGIMM Spin Electronic (Inv. 87020481) ➢ Amplifier Behringen mod. EPQ1200 (Inv. 87020515)
Measurement Uncertainty	Expanded uncertainty: 5,7% Coverage probability: 95% Coverage factor: 2,1

Number of samples under test	1

Test Conditions	Required	Measured
Ambient Temperature	(15 ÷ 35) °C	(21 ± 2) °C
Ambient Relative Humidity	(25 ÷ 75) %Rh	(50 ± 10) %rH

Test Setup	EN 61000-4-8 Par. 7
Test Procedure	EN 61000-4-8 Par. 8
EUT Operating Mode(s)	#1
Acceptance Criteria	A (see *COMPLIANCE CRITERIA FOR IMMUNITY TESTS)*
Test Voltage	230V ~ 50Hz

Test Results

Tested Port	Magnetic Field Characteristics		Result Classification	Notes
	Level	Frequency		
Enclosure	100 A/m	50 Hz	A	No performance degradation
Enclosure	100 A/m	16,7 Hz	A	No performance degradation
Enclosure	300 A/m	0 Hz	A	No performance degradation

Test N.6	**PULSED MAGNETIC FIELD -** *CAMPO MAGNETICO IMPULSIVO*

Reference Standard	EN 61000-4-9
Operative instruction	IO_BSP_933_009
List of reference equipment	➢ Loop MAGIMM Spin Electronic (Inv. 87020481) ➢ Amplifier Behringen mod. EPQ1200 (Inv. 87020515) ➢ Surge/Burst Generator Em Test mod. UCS 500 N7.7 (Inv. 87020438) ➢ Software IEC.CONTROL version 5.3.1 (Inv. 87020486)
Measurement Uncertainty	Expanded uncertainty: 5,7% Coverage probability: 95% Coverage factor: 2,1
Number of samples under test	1

Test Conditions	**Required**	**Measured**
Ambient Temperature	(15 ÷ 35) °C	(21 ± 2) °C
Ambient Relative Humidity	(25 ÷ 75) %Rh	(50 ± 10) %rH

Test Setup	EN 61000-4-9	
Test Procedure	EN 61000-4-9	
EUT Operating Mode(s)	#1	
Acceptance Criteria	B (see *COMPLIANCE CRITERIA FOR IMMUNITY TESTS)*	
Test Voltage	230V ~ 50Hz	110~ 60Hz

Test Results

Tested Port	**Magnetic Field Characteristics**		**Result Classification**	**Notes**
	Level	**Frequency**		
Enclosure	300 A/m	---	A	No performance degradation

END OF TEST REPORT